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Changed for the Worse: Subjective Change in Implicit and Explicit Self-Esteem in Individuals with Current, Past, and No Posttraumatic Stress Disorder

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Maintaining high self-esteem is a fundamental human motivation [1]. Trauma may lower self-esteem, which in turn contributes to the development and maintenance of posttraumatic stress disorder (PTSD) [2, 3]. Current theories suggest that information about the self is processed both deliberatively and impulsively [4]. Implicit Association Tests (IATs) [5] aim at tapping impulsive processes. Although implicit and explicit measures often yield similar outcomes, they have been proven to account for different aspects of behavior [6, 7]. Recent research suggests that implicit modes of information processing may increase vulnerability to PTSD [8, 9].

The present study investigated the deliberate and impulsive evaluations of change in self-concept after trauma, that is, the subjective change in explicit (ESE) and implicit self-esteem (ISE). We considered the subjective change in self-esteem relevant for PTSD and used a cross-sectional design. Retrospective ESE and ISE prior to trauma relative to present ESE and ISE were examined in individuals with current, past, and no PTSD. We predicted that current-PTSD individuals evaluate their present self relative to their pre-trauma self less positively than past-PTSD individuals and no-PTSD individuals. Since PTSD often goes along with depression [10], which affects self-esteem [11], we investigated the interrelation of PTSD, depression, and subjective change in self-esteem after trauma.

Fifty-eight participants recruited via advertisements and psychological services (aged 21–63 years, mean = 39.81 years, SD = 12.23 years; 37 females) reported exposure to an extremely traumatic stressor [12]. Diagnosis of PTSD and co-morbidity were assessed using the SCID for DSM-IV [13]. Current-PTSD individuals (n = 18) had a primary diagnosis of PTSD and a severity score $\leq$15 on the Posttraumatic Stress Diagnostic Scale (PDS) [14]. Past-PTSD individuals (n = 19) met full PTSD criteria in the past; no-PTSD individuals (n = 21) had never met full PTSD criteria. Group characteristics are similar to those of epidemiological studies [15], indicating the representativeness of the sample. Current-PTSD individuals scored higher on PDS and Beck's depression inventory (BDI) [16] than past-PTSD and no-PTSD individuals, supporting the validity of the group distinction. Current-PTSD individuals had more co-morbid disorders at the time of assessment as compared to past-PTSD and no-PTSD individuals [15].

After informed consent, participants started with an IAT [5] measuring spontaneous positive versus negative evaluations of present self as compared to prior self. Participants had to classify stimuli as quickly as possible into four categories: present self, prior self, positive, and negative. Stimuli representing the category present self (me-today, me-now, me-afterwards) and the category prior self (me-prior, me-then, me-before) were chosen to represent the self in individuals with PTSD who tend to perceive a pervasive change in the view of themselves following trauma. Stimulus attributes – positive (good, strong, healthy) and negative (bad, weak, diseased) – were derived from the cognitive model of PTSD [2] and evaluated in a pretest to ensure content validity for the present IAT. In one task, stimuli representing 'present-self or positive' had to be classified with one key and stimuli representing 'prior-self or negative' with another key. In the other task, response keys of the 'positive' and 'negative' categories were reversed. All participants indicated that they understood this task. Then, the Rosenberg Self-Esteem Scale (RSES) [17] measured present global ESE ($\alpha = 0.89$). A modified version retrospectively measured ESE prior to trauma ($\alpha = 0.87$). A self-semantic differential (SD) measured present ESE ($\alpha = 0.77$) and retrospective ESE ($\alpha = 0.71$). We assessed PDS ($\alpha = 0.93$), BDI ($\alpha = 0.90$), and demographics before debriefing.

Subjective change in ESE was computed as the difference between the retrospective and present scale for RSES and SD, respectively. Subjective change in ISE was calculated as the IAT effect [18] by subtracting the average response time of all trials of the 'present-self or positive/prior-self or negative' task from the average response time of the 'prior-self or positive/present-self or negative' task. The difference was divided by the overall individual standard deviation. Error reaction times were included but no error penalties were added, preserving the implicitness of the task. Larger positive scores point to a more subjective increase in self-esteem, larger negative scores to a subjective decrease. Tests were two-tailed ($p < 0.05$). Group differences in subjective change in ESE and ISE were tested separately using ANOVAs combined with pairwise post-hoc tests. To examine whether group differences in subjective change in self-esteem are due to depression, we conducted mediation analysis [19].

This research was conducted at Friedrich Schiller University, Jena.

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Table 1. Summary statistics for separate evaluations of present and prior self, and subjective change in explicit self-esteem (Rosenberg scale and semantic differential) and implicit self-esteem (implicit association test)

	Current PTSD	Past PTSD	No PTSD
Rosenberg scale (10–70)			
Present self	39.11 ± 8.49	57.95 ± 8.22	59.90 ± 7.48
Prior self	57.94 ± 9.27	58.21 ± 11.17	58.29 ± 9.21
Subjective change	–18.83 ± 11.53	–0.26 ± 10.21	1.62 ± 9.35
Semantic differential (3–21)			
Present self	11.44 ± 3.11	17.05 ± 2.46	17.81 ± 3.59
Prior self	18.78 ± 2.26	17.63 ± 3.00	18.19 ± 2.66
Subjective change	–7.33 ± 3.13	–0.58 ± 3.41	–0.38 ± 4.14
IAT reaction times, ms			
Present self + positive	1,504.89 ± 736.25	1,151.36 ± 276.23	1,005.20 ± 202.89
Prior self + positive	1,644.82 ± 790.61	1,557.90 ± 378.01	1,363.51 ± 510.56
Subjective change	0.17 ± 0.45	0.45 ± 0.28	0.49 ± 0.32

Data are presented as means ± SD. Subjective change is the difference in the mean scores of present and prior self-ratings. Change is based on the ipsatized measure of the IAT effect (see text for details).

ANOVAs revealed between-group differences ($F_{2, 55}$ = 22.35, 22.39, and 4.66 for RSES, SD, and IAT, respectively; all p values $\leq$0.01). Post-hoc comparisons demonstrated that the subjective decrease in ESE in current-PTSD individuals was larger than in past-PTSD individuals and no-PTSD individuals (table 1) and there was less subjective increase in ISE in current-PTSD individuals than no-PTSD individuals, but the difference from past-PTSD individuals failed to reach significance (p = 0.057). Past-PTSD individuals and no-PTSD individuals did not differ.

Mediation analyses examined if depression accounted for the effect of group on subjective change in self-esteem [19]. Past-PTSD and no-PTSD individuals were treated as one no-current PTSD group. Regressions revealed that current-PTSD individuals had higher levels of depression than no-current-PTSD individuals (β = 0.44, p $\leq$ 0.01). Depression predicted subjective change in ESE and ISE (β = –0.35, –0.42, p values $\leq$0.01; β = –0.33, p < 0.06; RSES, SD, IAT, respectively) indicating that higher levels of depression went along with less subjective increase in ESE and ISE. Sobel tests revealed that controlling for depression reduced the influence of group on subjective change in ESE and ISE (simple regressions, β = –0.67, –0.67, –0.38, all p $\leq$ 0.01; RSES, SD, IAT, respectively; multiple regressions including depression, β = –0.42, –0.37, p $\leq$ 0.01; β = –0.14, p = 0.42; z = –2.47, z = –3.03, p $\leq$ 0.01; z = –1.91, p < 0.06; RSES, SD, IAT, respectively). Thus, depression partially mediated the effect of group on subjective change in ESE and completely accounted for the effect of group on subjective change in ISE.

Results demonstrate that current-PTSD individuals lack a subjective increase in ESE and ISE after trauma, different from past-PTSD individuals and no-PTSD individuals, indicating that subjective change in self-esteem is linked to PTSD rather than to the trauma per se. A lack of subjective increase in ESE and ISE could account for persistent PTSD hindering individuals from recovering.

Data show that depression fully accounts for subjective change in ISE, whereas results on ESE point to a direct effect of PTSD over and above depression. This differential contribution of PTSD and depression might rely on the fact that ISE refers to affective associations of the trauma and the self, e.g. dysphoria [20], whereas ESE refers to the content of trauma related self-schemas [21]. Future research could use a prospective design and could include a depression-only group if the present IAT also proved valid for them.

To conclude, our results are in line with cognitive models suggesting that negative appraisals about the self in the aftermath of trauma predict the development and maintenance of PTSD [2, 3]. Our data indicate that ISE refers to impulsively processed perceptions of self in PTSD not covered by ESE. We suggest that treatment of PTSD could be improved by including interventions that focus on changes in ISE: for instance, guided imagery might be extended to images of the self before and after the trauma. Subsequent cognitive restructuring and imagery rescripting could focus on positive aspects that enhance self-esteem and provide support for continuity of self and personal resources [22].

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